

These are my reactions. I apologize for having probably been a little bit messy, but I wrote this in various small pieces. However I think that there are various points of discussion and I hope our exchanges of views will lead to an interesting outcome.

With my warm wishes



Giancarlo

PS. I am coming to London for few days. I have not yet my plan completely fixed but I will be probably there on saturday 9 and/or sunday 10 (on monday I am at the EJP editorial board meeting). Are you by any chance in London in those days? If yes we could manage to meet shortly or at least to speak by telephone. I cannot commit myself entirely to this because I have a flou and I hope it will not interfere with my travel.



Bielefeld  
23 July 95

~~06/11~~  
To Cushing, Ghirardi, Redhead et al!  
From Butterfield

Dear friends,

I have tried to read with fresh eyes and have concluded.

① About CG 1994

§2.5 just does the Lorentzian EPR, with maintenance of the actual world's Right outcome, in the counterfactual worlds where one measures on left. (This maintenance follows from locality (v)  $\equiv$  L-Loc; cf. p 407  $\rightarrow$  408)

§2.6, 2.7 just suggest that without locality no argument can be launched. Reasonable enough? I say "without locality", because of title of section, p 409 para 1 expressing scepticism about L-Loc, and §2.7 showing how the maintenance of outcomes fails with nonlocality fully accepted.

② About RR (I set aside my disagreements with their Section 5, i.e. my feeling they dismiss Lewis cavalierly.)

I think p 8 para 2  $\rightarrow$  p 9 end para 1 is a misreading of CG  
But it's very understandable! (and p 10 para 1 falls also, once CG reject OM-Loc; for which cf. III)

Because

① Opening para of §2.6, mid p 408, seems to have the EPR conclusion arriving only from §2.4, not from §2.5

② p 408 bottom to p. 409 top seem to echo <sup>(topic of)</sup>, but to refute, §2.5's argument, especially 408 bottom to 408 top (i.e. the use of OM-Loc at start of ~~the~~ relativistic EPR argument).

So RR's accusation of bad logic (p 9 first half) is understandable

③ About CG fax reply This brings out that RR is a misreading.

It is a pity that CG don't signal in 1994, and earlier even in fax, that CG do not endorse OM-Loc (and presumably not PLCD, though they do think, à la Lewis, OM-Loc  $\Rightarrow$  PLCD)

To sum up, p 408 bottom to p 409 top is NOT meant to go for

from L-Loc  $\wedge$  QM form  $\wedge$  Compl  $\Rightarrow$   $\neg$  (L-Loc) (= result of §2.5)  
to QM form  $\wedge$  Compl  $\Rightarrow$   $\neg$  (L-Loc)

(which would be a fallacy as RR p. 9 say)

It is meant to go:

from L-Loc  $\wedge$  QM form  $\wedge$  Compl  $\Rightarrow$   $\neg$  (L-Loc) (= result of §2.5)  
to QM form  $\wedge$  Compl  $\Rightarrow$   $\neg$  (OM-Loc)  $\wedge$   $\neg$  (ER-Loc)

Right?!? or no

ditto

$\Rightarrow$   $\neg$  (ER-Loc)

$\psi_0 \rightarrow \sum u_j(t) \psi_j$   
H.M.D

$\psi_0$

Alimud: is

00-39-433-886667 c/Hage  
39-40-2240233 office.  
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but of a mix-up on this.

There was never any question of  
allowing an paper to be printed  
before consulting you, and in  
the great we agree that the  
preliminary version was ~~not~~ <sup>not</sup>  
your approval, or acknowledged  
as my personal letter.

So what to do now?

First of all I am going to send  
a summary of your argument for  
preparing a resolution of ~~the~~ <sup>on</sup> ~~the~~ <sup>as</sup>  
compared with ~~the~~ <sup>from</sup> ~~the~~ <sup>the</sup>  
relatively part of now.

In the event that we agree with  
these arguments, the I shall your  
and forward. I should write a short  
paper on under your plan, setting  
out the clarification of your position.

In addition I am opposed to the  
understanding was not the probable  
nature of the counterpoints involved in  
that case could be included.

18.9.75

Dear Gian Carlo,

Thank you for your fax.  
Let me say at once I am very  
sorry to have upset you.  
There are two points of clarification  
I would like to make.

- 1.) It was always my understanding  
from Jim Cushing that you  
would be commenting on any  
residual disagreement between us  
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- 2.) The delay in sending the draft  
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footnotes and references before we  
sent it to you. Since he had  
left Cambridge for a visit to  
Europe and had gone to Oxford  
for relations here, there was a  
P.T.V.



3

I am tempted to think a joint  
paper would be appropriate.

I am particularly anxious that any  
student La Riviere should get  
credit for heavy thought. Long and  
hard about these issues and  
a joint paper might do the work  
effectively that just an abstract would.

I value your opinions and  
provisions in the letter you have  
written, and hope very much that  
our friendship will continue,  
strengthened rather than weakened  
by this summer's unfortunate  
events.

What but could

P.S. Jim Conkey has just called —  
he likes the idea of a joint  
paper for his volume if we  
could manage it





Date: Mon, 11 Sep 1995 17:03:36 +0100 (BST)  
From: "Dr J.N. Butterfield" <jb56@cus.cam.ac.uk>  
To: Carolyn McKee <camckee@nwu.edu>  
Cc: malament <d-malament@uchicago.edu>, redhead <jmt10@cus.cam.ac.uk>  
Subject: For Patrick La Riviere

Dear Patrick (AND COPY TO MALAMENT AND REDHEAD AS A WAY OF GIVING PATRICK THE EMAIL ADDRESSES HE HAS ASKED FOR;

DEAR DAVID YOU WILL REMEMBER  
PATRICK AS THE VISITING STUDENT HERE IN CAMBRIDGE WHO GRACIOUSLY HOSTED  
IN HIS HARVARD SCHOLAR ROOMS IN EMMANUEL YOUR 'POW-WOW' DISCUSSION OF  
RELATIVISTIC LOCALIZATION IN MAY)

DEAR JENNY; PLEASE TELL MICHAEL THIS ADDRESS FOR LARIVIERE

THANKS FOR YOUR MESSAGE! Are you living in Evanston (Sally and I did for  
18 months!) I presume youve heard that Ghirardi and Grassi's comments  
have prompted Michael to rewrite your joint paper for the Cushing ety  
al. volume.

I hope that in addition to David Malament, yo will meet during your time  
there, Jon Jarrett who I believe arrives this fall at the Univy of  
Illinois at Chicago dept. of Philosophy (from Cornell). Hes a super guy.

Must dash, but let's stay in touch! Good luck settling down.

Best jeremy



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TO PROF. M. REDHEAD

FAX N.

FROM G.C. Ghinardi -

DATE Sept 26, 95

NUMBER OF PAGES, COVER SHEET INCLUDED

3 pages

MESSAGE

see at the desk -

Regards

G. Ghinardi



D. [unclear]

on [unclear] [unclear]

[unclear] [unclear]

[unclear] [unclear]

[unclear] [unclear]

[unclear] [unclear]

UNIVERSITY OF CAMBRIDGE  
DEPARTMENT OF HISTORY AND PHILOSOPHY OF  
SCIENCE

FROM: Head of Department

Free School Lane  
Cambridge CB2 3RH  
Tel: 01223 334556  
Fax: 01223 334554

Professor Michael Redhead FBA

18 September 1995

Professor GianCarlo Ghirardi  
Director  
Dipartimento di Fisica Teorica  
Universita' di Trieste  
Strada Costiera 11  
Mirimare Girignano  
34014 Trieste  
Italy

Dear GianCarlo,

Thank you for your fax. Let me say at once that I am very sorry to have upset you.

There are two points of clarification that I would like to make:

- 1 It was always my understanding from Jim Cushing that you would be commenting on any residual disagreement between us in the Bohm volume.
- 2 The delay in sending the draft manuscript to you was due to the fact that I asked La Reviere to fill out the footnotes and references before we sent it to you. Since he had left Cambridge for a visit to Europe and I had gone to Oxford on sabbatical leave, there was a bit of mix up on this.

There was never any question of allowing our paper to be printed before consulting you, and in the event we agree that the preliminary version misrepresented your arguments, as acknowledged in my previous letter.

So what to do now?

First of all I am eager to see the summary of your argument for preferring a violation of OM-LOC as compared with ER-LOC from the relativity point of view. In the event that we agree with these arguments, then I think you and Renata should write a short paper as under your option (c), setting out the clarification of your position. In addition, some reference to the indeterminism issue and the problematic nature of the counterfactual involved in that case could be included.





I am tempted to think a joint paper could be appropriate. I am particularly anxious that my student La Riviere should get credit for having thought long and hard about these issues and a joint paper might do this more effectively than just an acknowledgement.

I value your openness and frankness in the letter you have written, and hope very much that our friendship will continue, strengthened rather than weakened by this summer's unfortunate events.

With best wishes.

Yours sincerely,

Michael Redhead

PS Jim Cushing has just called - he likes the idea of a joint paper for his volume if we can manage it.



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*Prof. GianCarlo Ghirardi, Director*  
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Trieste september 26 1995

Prof. Michael Redhead  
Head of Department of  
History and Philosophy of Science,  
University of Cambridge  
Free School Lane  
Cambridge CB2 3RH  
UK

Dear Michael,

thanks for your FAX and for your clarifications about what happened. Let me come immediately to the crucial point you raise: So what to do now?

To answer this question I will consider two possible scenarios:

1. We put forward our argument for preferring a violation of OM-Loc to ER-Loc. Suppose you do not agree on it being conclusive. We can start a debate and again I see two possibilities:

- either you convince ourselves that we are wrong and our argument is not appropriate, then I think we (Renata and myself) have nothing to say and you can write a paper and we will judge whether to reply or not,
- or from the debate we (both you and us) get some new insight and then we write a paper together.

2. Suppose you consider our argument correct. This would essentially mean that, in spite of some lack of clarity, our original paper was OK. In the paper we had already planned to write we intended to reconsider the subject by stating that we have been convinced, thanks to your remarks, that our argument could have been presented in a much more concise and clean form and we were going to do this, adding a new result about a specific example supporting our views (this is a new idea we had in these days).

In spite of this original project by us which is practically completed, we are now sensitive to your worries about helping your student La Riviere, so, we have considered, even assuming scenario 2, the possibility of writing a joint paper. However, in such a case (i.e. assuming you recognize that we are right) there are some basic points we want to be respected in order to follow this line. Let me list them:

a. From the joint paper it should appear that the results which will be expoused in a better, more simple and clean way, had been originally obtained by us. In other words we do not want people to be lead to think that the new one is the paper in which the considered results have been derived for the first time. The reasons for this attitude should be clear: we



consider of some interest for the debate about the EPR argument our analysis and we would like that our previous and (in our opinion) correct discussion on the matter would be recognized.

b. We are keen to accept that some discussion about the fact that the use of counterfactuals in an indeterministic context is problematic appears in the joint paper and we are ready to include your point of view, but we do not want to commit ourselves to your position and to take firmly a position opposite to Lewis. Here are our reasons for this: even though we have probably not thought to the problem too deeply, we have devoted to it sufficient attention to have our ideas, and, as we have stated in the short reply to your original paper, we are personally more inclined to take Lewis' position. But we do not want and we feel no need to state this explicitly, simply we do not want to take explicitly the opposite position. There are at least two good reasons for this choice. The first one is that the structure of our argument is not: **taking Lewis' position we prove that ...but it is: we show that even if one would be allowed to take Lewis position he will not be entitled to claim that ER-Loc is violated.** This therefore should make our argument acceptable to you and in any case it makes it more general than the one in which one simply refuses to even contemplate the possibility of using counterfactuals in the considered context. This being the case, there is no need to go deeply into a debate about whether the position is legitimate or not: in all circumstances the conclusion of the violation of ER-Loc does not follow. The second reason is that it seems to us that, if you do not follow the lines we have followed, the paper **practically evaporates**. It reduces simply to state: accepting that property attribution has to be related to the possibility of making counterfactual statements (as we have stressed in our original paper) since in the case of a genuinely stochastic situation one is not allowed to use counterfactuals, one cannot claim anything at all (and so, incidentally, he cannot even claim that there is creation of elements at-a-distance).

Let me conclude. If you agree on the above points we can pass to the second stage, i.e. to sending you our final version containing:

- The reasons which make acceptable the violation of OM-Loc
- The new example we have discovered
- The final version of our short paper "Reply to critics" that Jim Cushing has given to you.

On this basis you will elaborate, and I am sure you will enrich, the paper. We will then see whether we agree on the final version and in such a case we will jointly sign (the 4 of us) the final version for the Bohm volume.

We are waiting for your opinion about this proposal.  
With best regards, yours sincerely

*GianCarlo Ghirardi*

GianCarlo Ghirardi





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TO PROF. C. PAGANIS

FAX N. 0044-1223-33593

FROM G. C. Ghirardelli

DATE Sept 5, 95

NUMBER OF PAGES, COVER SHEET INCLUDED

4

MESSAGE

Dear Prof. Paganis,  
here is my FAX  
for Prof. Red head

Thanks -

Regards

Giancarlo Ghirardelli

